Oct. 29, 1963 H. J. CRANE, JR 3,108,580

NON-ROTATABLE VALVE TAPPET

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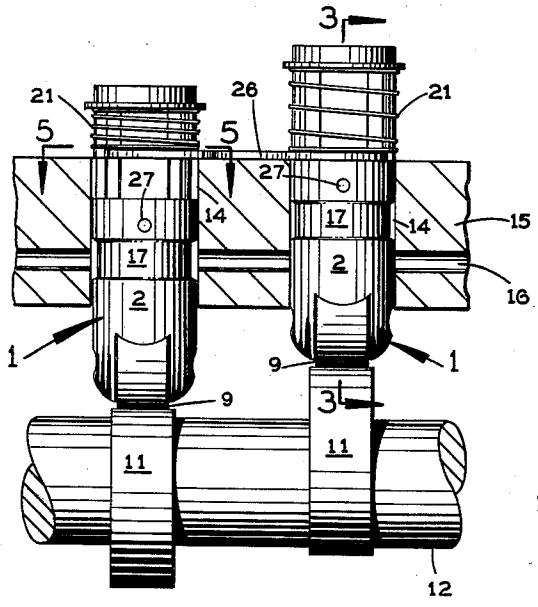

FIG. 1

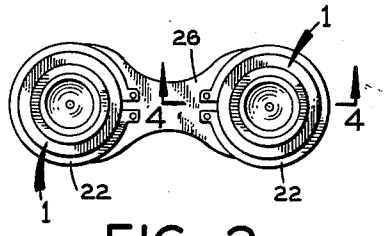

FIG. 2

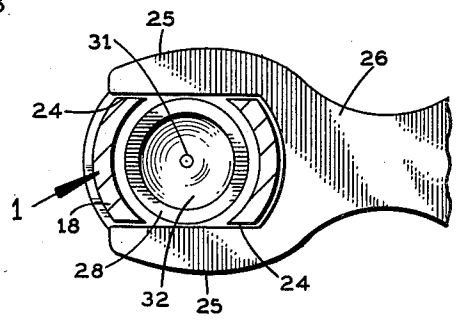

FIG. 5

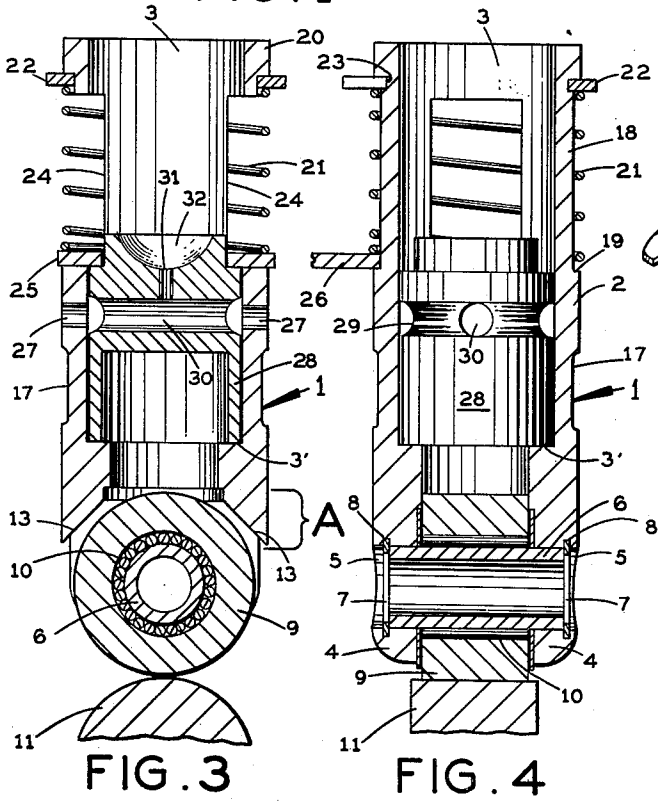

FIG. 3

FIG. 4

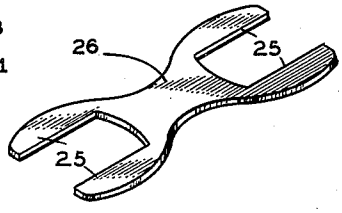

FIG. 6

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NON-ROTATABLE VALVE TAPPET

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This invention relates to automative valve lifters and has particular reference to a valve lifter that is freely operable without rotation.

The present invention contemplates a valve lifter of the type that is guided in cylindrical openings of the engine block and with the valve lifters being provided with a roller for engagement with the conventional cams formed on the cam shaft of the engine and with adjacent lifters, comprising inlet and exhaust valves, there has been provided a plate that extends between the two adjacent lifters and whereby the lifters may be reciprocated up and down without axial rotation.

Preventing rotation of the valve lifter is absolutely essential when the tappets or lifters have a roller contacting the cam shaft which provides the correct timing and lift. The principal application of this invention is for use with special cam shafts and the non-rotating tappet is provided with an alignment bar or plate that seats upon a surface of the engine block and that is held in position against vertical movement by compression springs and with the tappets being connected with respect to the alignment bar in a manner to prevent the rotation of the tappet.

A further object of the invention is to provide a tappet of the type that has a hollow cylindrical body that is forked at its lower end to receive a roller bearing and with a piston disposed within the body to engage a conventional valve stem and with the body at its upper portion being cut away at two opposite sides to receive a forked end of an alignment bar.

A further object of the invention is to provide a tappet of cylindrical hollow shape that is cut away at its lower end to receive a journaled roller bearing and with the tappet body being skirted over the periphery of the roller to obtain a maximum wearing surface for the tappet body with respect to the block to thus obtain a maximum support for the tappet in its up and down movement thus permitting the tappet body to be formed of a light weight meal and reducing the reciprocating weight of the valve train and to permit an internal combustion engine to operate at much higher speeds. The valve tappet operates through the openings of the engine block and is so constructed that it collects oil from conventional oil channels and the construction is such that no appreciable amount of oil will be collected into the tappet that would additionally increase its weight.

Novel features of construction and operation of the device will be more clearly apparent during the course of the following description, reference being had to the accompanying drawings wherein has been illustrated a preferred form of the device and wherein like characters of reference are employed to denote like parts throughout the several figures

In the drawings:

FIGURE 1 is a side elevation of a pair of valve tappets constructed in accordance with the invention and with a portion of the engine block being shown in section,

FIGURE 2 is a top plan view of the tappet assemblies illustrated in FIGURE 1,

FIGURE 3 is a vertical section taken substantially on line 3—3 of FIGURE 1,

FIGURE 4 is a sectional view taken substantially on line 4—4 of FIGURE 2,

FIGURE 5 is an enlarged horizontal section taken substantially on line 5—5 of FIGURE 1, and

FIGURE 6 is a perspective view of an alignment bar.

Referring specifically to the drawings, there has been illustrated a pair of adjacent tappet devices 1. Each tappet is substantially identical and a description of one will suffice for both. The tappets each embody a tubular cylindrical body 2 having a cylindrical bore 3. The bore 3 terminates downwardly at a shoulder 3'. The body 2 is open at its upper end and its lower end is forked to provide a pair of side flanges 4. The flanges 4 are apertured at 5 to receive a sleeve 6. The sleeve 6 is held against displacement from the apertures 5 by split rings 7, having a snapping engagement into cut grooves 8. Rotatable upon the sleeve 6 is a roller 9, anti-frictionally supported by needle bearings 10. The roller projects below the flanges 4 for contacting engagement with cams 11, formed upon the usual cam shaft 12 and through the medium of which the body 2 is oscillated in a vertical manner. The body 2 at its lower end is skirted at 13 to partially overlie the periphery of the roller and whereby to increase the bearing of the body 2 through the guide openings 14, formed in the engine block 15, fragmentarily illustrated in FIGURE 1. The block 15 is provided with the usual oil port 16 whereby oil under pressure is delivered to all of the tappets in the group. The body 2 is further circumferentially grooved at 17 to reduce the frictional engagement between the body and the openings 14 and to constitute an oil passage to the next tappet.

The body portion 2 at its upper portion is reduced in diameter as shown at 18, forming a shoulder 19 and an upper flange 20. Disposed upon the reduced portion 18 is a coil spring 21. The coil spring 21 at its upper end bears against a split ring 22 that engages within an undercut groove 23 below the flange 20. The upper portion of the body 2 is cut away and slotted to form relatively flat side walls 24. In each pair of tappets 1, the flat side walls are engaged by legs 25 of an alignment bar 26. The alignment bar extends between two adjacent tappets 1 and prevents the rotation of the tappets during their oscillatory movement and the bar 26 rests upon the top surface of the engine block 15 and is held in such engagement by the springs 21. As the tappet is raised by the cams 11, the bar 26 is biased toward the surface of the block 15 at all times and the engagement of the legs 25 upon the opposite flat sides of the tappet prevent any rotation of the tappet. Two opposite sides of the body 2 are apertured at 27 to constitute oil ports that receive oil from the oil ports 16 and whereby oil is conducted for lubrication of a tappet piston, to be described.

Slidable within the bore 3 of the body 2, is a piston 28, normally resting upon the shoulder 3'. The piston is circumferentially grooved adjacent its upper end as indicated at 29 and with the groove being substantially in alignment with the apertures 27. The piston 28 is transversely bored from the groove 29 as indicated at 30 and the bore 30 communicates with a port 31 that enters a concave portion 32 formed in the upper end of the piston for the seating engagement of the lower end of a valve push rod, not shown and whereby the push rod will be lubricated with respect to the piston. Lubricating oil will flow through the ports 27, to the groove 29 and through the port 31 through the recess 32 during the oscillatory movement of the tappet.

The tappet is assembled with respect to the block 15 in the usual manner and such assembly requires no exceptional mechanical skill. When the tappet is inserted through the openings 14, their upper flat sides are engaged with the bars 26 and the springs 21 then engaged over the upper portion of the body to bear against the bar 26. The ring 22 is then engaged within the groove 23 below the flange 20, maintaining the spring in bearing engagement with respect to the bar 26. The conven-

tional push rods are then inserted through the block of the engine with their lower ends bearing within the recess 32 and with the rollers 9 bearing against the cams 11. As the engine is operated, the cams 11 will force the body 2 upwardly against the tension of the conventional valve springs and at all times, regardless of the speed of the engine, the tappets will partake of vertical movement without rotation and will maintain the rollers 9 in accurate engagement with the cams 11. The pistons 28 may of course be free to rotate since the lubrication to the recess 32 will be maintained at all times through the medium of the ports 27 and the groove 29. The device is simple in construction, is strong, durable, permits of the device being manufactured of light weight metal, such as aluminum, has a definite bearing at all times through the openings 14 of the block due primarily to the skirts 13. The structure primarily is to prevent rotation of the tappets and to permit the rise and fall of the tappets under the influence of the cams 11 and has few and simple parts that may be economically manufactured and installed within a minimum of effort.

It is to be understood that the invention is not limited to the precise construction shown, but that changes are contemplated as readily fall within the spirit of the invention as shall be determined by the scope of the subjoined claims.

I claim:

1. A non-rotatable valve tappet for internal combustion engines wherein a pair of adjacent tappets are employed to actuate alternately the intake and exhaust valves of the engines, each tappet comprising a cylindrical hollow housing open at its upper end, the housing being reciprocatable through a cylindrical opening formed in a portion of an engine block, a lower portion of the housing being bifurcated to rotatably receive a roller that engages a cam device formed upon a cam shaft of the engine, the housing being biased upwardly by a coil spring that is disposed upon the upper portion of the housing that extends above the engine block, the opposite sides of the upper portion of the housing being formed flat, a plate disposed upon the top of the block and with the plate having its ends bifurcated to simultaneously engage the flat sides of two adjacent tappets whereby the tappets are prevented from rotation during the reciprocating movement, a piston device seated within the housing of each tappet and with the upper end of the piston being concave to receive the lower end of a valve push-rod and means to lubricate the housing and the concave piston.

2. A non-rotatable valve tappet for internal combustion engines that comprises, a cylindrical body portion that reciprocates through a cyclindrical opening formed in an engine block, the lower end of the housing being bifurcated, a hollow shaft extending through the bifurcations, a roller anti-frictionally supported upon the shaft, the roller adapted to engage a cam formed upon a cam shaft of the engine, an upper portion of the housing extending above the opening of the engine block, a compression spring engaging over the upper end of the housing, two opposite sides of the housing at it supper end being formed flat, a flat plate adapted to rest upon the engine block and having its opposite ends bifurcated and whereby the plate and its ends extend between two adjacent tappets for preventing rotation of the tappets, the housing having an axial bore and with the bore terminating in a shoulder intermediate the length of the tappet, the bore being cylindrical and with the bore opening at the top of the tappet, a piston engaging within the bore and seating upon the shoulder, the upper end of the piston having a concave recess for engagement with a lower end of a valve push-rod, the piston having a circumferential groove that communicates with opposite openings formed in the side walls of the housing and whereby to receive lubricating oil from an oil channel formed in the engine block, the said springs being fixed upon upper extensions of the housings against displacement therefrom and with the springs bearing upon the bifurcations of the plate.

3. The structure according to claim 2 wherein the lower portion of the housing between the bifurcations thereof is provided with a skirt, the housing, the bifurcations thereof and the skirt being molded integral, the upper extension of the housing being circumferentially grooved to receive a C-ring and thereby fixing the spring from displacement from the housing.

4. The structure according to claim 2 wherein the circumferential groove of the piston is ported transversely of the piston and a second port extends from the last named port to transmit oil to the concave recess of the piston.

5. The structure according to claim 2 wherein the hollow shaft is held within openings in the bifurcations of the housing by C-rings, the said roller being rotatable upon needle bearings.

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